

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZTE USA, INC.,
Petitioner

v.

SAINT LAWRENCE COMMUNICATIONS, LLC,
Patent Owner

Case IPR2016-00705
U.S. Patent 7,260,521

SAINT LAWRENCE COMMUNICATIONS, LLC'S PATENT OWNER
PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.107(a)

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PATENT OWNER'S EXHIBIT LIST

<u>Exhibit Number</u>	<u>Description</u>
2001	P. Mermelstein, "G.722, A new CCITT Coding Standard for Digital Transmission of Wideband Audio Signals," IEEE Comm. Mag., Vol. 26, No. 1, pp. 8-15, Jan. 1988.
2002	Fuemmeler et. al, "Techniques for the Regeneration of Wideband Speech from Narrowband Speech," EURASIP Journal on Applied Signal Processing 2001:0, 1-9 (Sep. 2001).
2003	C.H. Ritz et. al., "Lossless Wideband Speech Coding," 10th Australian Int'l. Conference on Speech Science & Technology, p. 249 (Dec. 2004).
2004	Expert Declaration of Dr. Gottesman
2005	"Discrete-Time Signal Processing," by Alan V. Oppenheim, Ronald W. Schafer

TABLE OF AUTHORITIES

CASES

<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398, 418 (2007).....	5, 48,49
<i>OSRAM Sylvania, Inc. v. Am. Induction Techs., Inc.</i> , 701 F.3d 698, 706 (Fed. Cir. 2012).	4, 48, and 58

OTHER AUTHORITIES

<i>Epistar, et al. v. Trustees Of Boston University</i> , IPR2013-00298, Paper 18 (P.T.A.B. November 15, 2013).	4, 57,58
MPEP §§ 2141.01, 2141.02.....	27

I. INTRODUCTION

The Board should deny the present request for *inter partes review* of U.S. Patent No. 7,260,521 (“the ‘521 patent”) because there is not a reasonable likelihood that the Petitioner would prevail at trial with respect to at least one claim of the ‘521 patent for three separate and independent reasons.

First, each of the Petitioner’s proposed grounds of rejection is missing one or more limitations of the claims of the ‘521 patent.¹ For example, Ozawa (*i.e.*, the sole reference relied upon by Petitioner for its proposed anticipation ground) does not disclose the particular structure of components recited by independent claim 1 or the particular steps recited by claim 55. The invention that is disclosed and claimed in the ‘521 patent is fundamentally different than Ozawa’s system. The invention of the ‘521 patent generates *a pitch code vector from a pitch codebook search for each subframe* of input audio data, calculates a *pitch prediction error of the pitch code vector in each of at least two signal paths*, and selects the signal path having the *lowest (long term) pitch prediction error for the subframe*. Ozawa’s system, in sharp contrast, determines the *short-term prediction coefficients (LPC) for a frame* of speech data, classifies the calculated corresponding lowest *prediction error of the LPC into two or more modes*, and

¹ *Infra*, §§ V.A.2 and V.B.2-8.

selects that mode having the *lowest LPC prediction error for the frame*. The mode selected for a frame is used for selecting a single path used for the computation of the code vector distortions for all the subframes in the frame.

Because of these fundamental differences between Ozawa and the ‘521 patent, Ozawa does not disclose many of the claim limitations of independent claims 1 and 55. For example, Ozawa does not disclose “at least two signal paths associated to respective sets of pitch codebook parameters ... each signal path ... calculating a pitch prediction error of said pitch codevector from said pitch codebook search device.” Ozawa also does not disclose “at least one of said at least two signal paths comprises a filter for filtering the pitch codevector [generated from a pitch codebook search].” Ozawa also does not disclose “choosing the signal path having the lowest calculated pitch prediction error [of said pitch codevector from said pitch codebook search device].”

Moreover, none of the combinations of prior art references asserted by Petitioner in its proposed obviousness grounds teach all of the claim limitations of either of the two other independent claims (*i.e.*, claims 28 and 37) that were challenged by the Petitioner. Independent claims 28 and 37 also require the same limitations from claim 1 and Petitioner did not allege that any secondary reference asserted against claims 28 and 37 teaches the limitations that are missing from Ozawa. For these reason alone, there is not a reasonable

likelihood that the Petitioner will prevail at trial with respect to at least one claim of the '521 patent.

Second, the Petitioner did not present any objective evidence as to why one of ordinary skill in the art would have been able to combine the various teachings of entirely different approaches to achieve the particular pitch analysis device required by all of the challenged independent claims of the '521 patent. For example, the Petitioner did not demonstrate that a skilled artisan would have combined the teachings of Ozawa and Ordentlich to achieve the claimed invention of the '521 patent given that the two references use two different sampling rates, compute parameters for different bands and/or sampling rates, have different parameter ranges, have different codebooks, have different LPC orders, have different weighting filters, and have different frame sizes. Ordentlich is a Low-Delay CELP that uses extremely low subframes (<1ms) as opposed to 5-10ms for CELP like the system of Ozawa.² Indeed, Ordentlich teaches that pitch prediction (which is claimed in the '521 patent) may be completely avoided for the LD-CELP systems, like the one

² See Ex. 1007, Ordentlich, cols. 3-4.

disclosed in Ordentlich.³ Indeed, Ordentlich implemented his LD CELP system without any pitch prediction.⁴ Moreover, the LPC parameters discussed in Ozawa are not transmitted in LD-CELP systems like the one disclosed in Ordentlich.

Thus, the Petitioner did not show that a “skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.”⁵ The Board has consistently declined to institute proposed grounds of rejections in IPR proceedings when the Petition fails to identify any objective evidence such as experimental data, tending to establish that two different structures can be combined to achieve the claimed invention with a reasonable expectation of success.⁶ Here, the Petitioner did

³ *Id.* at col. 4, ll. 55-56

⁴ *See id.* Exhibits. 1025 and 1031.

⁵ *OSRAM Sylvania, Inc. v. Am Induction Techs., Inc.*, 701 F.3d 698, 706 (Fed. Cir. 2012).

⁶ *Epistar, et al. v. Trustees Of Boston University*, IPR2013-00298, Decision Not To Institute, Paper No. 18 (P.T.A.B. November 15, 2103).

not set forth any such objective evidence.⁷ For this additional reason, there is not a reasonable likelihood that the Petitioner will prevail at trial with respect to at least one claim of the '521 patent.

Third, the Petitioner neglected to follow the legal framework for an obviousness analysis set forth long ago by the Supreme Court.⁸ That framework requires consideration of the following factors: (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. The Board has previously warned that failure to identify differences between the cited art and the claims is a basis for denying a petition:

A petitioner who does not state the differences between a challenged claim and the prior art, and relies instead on the Patent Owner and the Board to determine those differences based on the rest of the submission in the petition risks having the

⁷ See e.g., Petition, pp. 20-54.

⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966); see also *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 399 (2007) (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors define the controlling inquiry.”)

corresponding ground of obviousness not included for trial for failing to adequately state a claim for relief.⁹

The Petitioner ignored the Board’s warning by failing to identify the differences between the challenged claims and the prior art. That is, the Petitioner failed to identify the claim limitations that it believed are missing from the primary reference (*i.e.*, Ozawa) and are instead taught by the secondary references (*i.e.*, Ordentlich and G.792).¹⁰ Rather, Petitioner provided a description of each reference followed by a conclusory statement that the references taught certain claim limitations, leaving the Board to figure out whether the primary or secondary reference best teaches the claim limitation.¹¹ Under this circumstance, it would be “inappropriate for the Board to take the side of the Petitioner to salvage an inadequately expressed ground ...”¹² For this additional reason, *inter partes* review based on obviousness

⁹ *Liberty Mutual v. Progressive Casualty*, CMB-2012-00003, paper 7 at 2 – 3.

¹⁰ Petition, pp. 20-54.

¹¹ *Id.*

¹² *Liberty Mutual v. Progressive Casualty*, CBM-2012-00003, paper 7 at 2 – 3; paper 8 at 14-15.

should be denied.¹³

For the reasons mentioned above as explained more fully below, the Petitioner failed to show that it is reasonably likely to prevail on any proposed ground. Accordingly, the Board should deny the Petition.

II. TECHNOLOGY BACKGROUND

A. Prior Art Speech Processing

As discussed in the background of the '802 patent, there is a trade-off in speech processing between the quality of a speech signal and the bit rate of the speech signal.¹⁴ “One of the best prior art techniques capable of achieving a good quality/bit rate trade-off is the so-called Code Excited Linear Prediction (CELP) technique.”¹⁵ In CELP, a sampled speech signal is processed in successive blocks of a predetermined number of samples called frames.¹⁶ The frames are divided into smaller blocks called subframes.¹⁷ An excitation signal

¹³ See *infra*, § VI.B.1.

¹⁴ Exhibit 1001, '521 patent, col. 1, ll. 30-38.

¹⁵ *Id.* at col. 1, ll. 39-41.

¹⁶ *Id.* at col. 1, ll. 41-46.

¹⁷ *Id.* at col. 1, ll. 46-48.

consisting of a past excitation component called an adaptive codebook and an innovative or fixed codebook is determined for each subframe.¹⁸ “This excitation signal is transmitted and used at the decoder as the input of the LP synthesis filter in order to obtain the synthesized speech.”¹⁹

As explained by the '802 patent, “[t]he CELP model has been very successful in encoding telephone band sound signals.”²⁰ But “[t]he demand for efficient digital wideband speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications.”²¹ And “[s]ome difficulties arise when applying the telephone-band optimized CELP model to wideband signals.”²² For example, “[w]ideband signals exhibit a much wider

¹⁸ *Id.* at col. 1, ll. 49-53.

¹⁹ *Id.* at col. 1, ll. 54-56.

²⁰ *Id.* at col. 2, ll. 8-9.

²¹ *Id.* at col. 1, ll. 16-30.

²² *Id.* at col. 2, ll. 17-18.

dynamic range compared to telephone-band signals, which results in precision problems when a fixed-point implementation of the algorithm is required.”²³

In addition, “the CELP model will often spend most of its encoding bits on the low-frequency region, which usually has higher energy contents, resulting in a low-pass output signal.”²⁴ “Further, the pitch contents in the spectrum of voiced segments in wideband signals do not extend over the whole spectrum range, and the amount of voicing shows more variation compared to narrow-band signals.”²⁵ Thus, prior art “pitch search structures [for wideband signals] are not very efficient.”²⁶ Accordingly, there existed a need “to improve the closed-loop pitch analysis to better accommodate the variations in the voicing level.”²⁷

²³ *Id.* at col. 2, ll. 21-24.

²⁴ *Id.* at col. 2, ll. 25-28.

²⁵ *Id.* at col. 2, ll. 34-38.

²⁶ *Id.* at col. 2, ll. 41-42.

²⁷ *Id.* at col. 2, ll. 42-44.

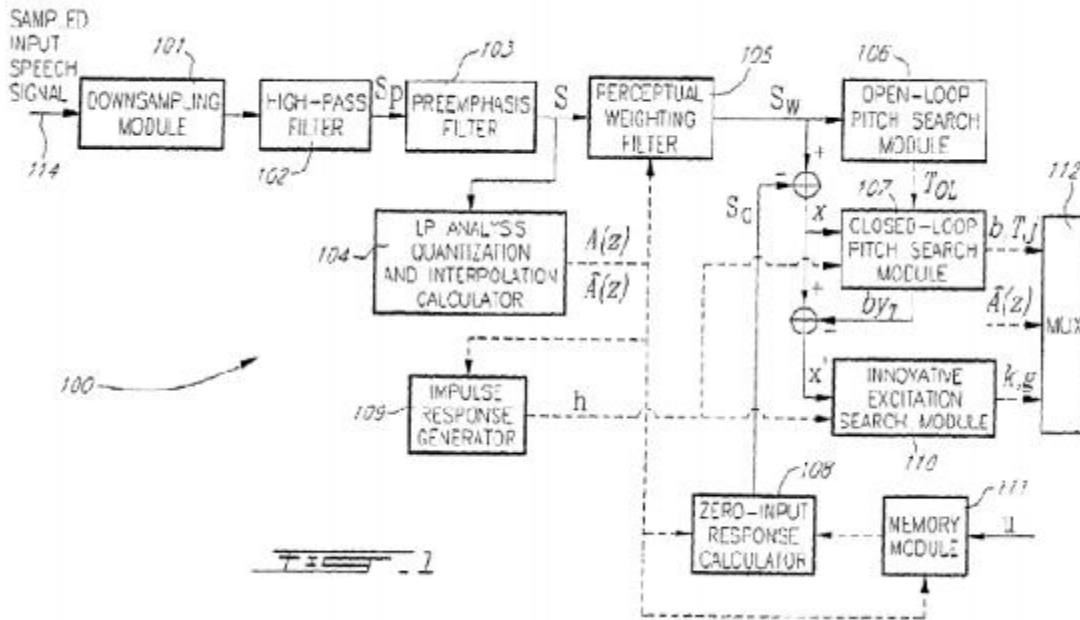
B. The '521 Patent: Bruno Bessette, Redwan Salami, and Roch Lefebvre Invent A New Device For Improved Pitch Analysis To Better Accommodate Variations In Voicing Level.

The '521 patent addresses the deficiencies of the prior art with a device that efficiently encodes wideband sound signals “using improved pitch analysis in order to obtain [a] high [] quality reconstructed sound signal.”²⁸

Indeed, the '521 Patent was originally assigned to VoiceAge Corporation, a leading contributor to the Adaptive Multi-Rate Wideband (“AMR-WB”) audio coding standard. The AMR-WB standard is implemented worldwide in mobile devices. The '521 Patent has been declared essential to the AMR-WB standard.

The '521 Patent discloses and claims an encoder for encoding a wideband input signal having a particular set of components arranged in a particular structure. One embodiment of the encoder is illustrated in FIG. 1, which is reproduced below:

²⁸ *Id.* at col. 2, ll. 49-52.



This encoder includes a Linear Predictor Quantization and Interpolation Calculator 104 that is responsive to a wideband input signal 114 and produces unquantized Linear Prediction filter coefficients and quantized interpolated LP filter coefficients for a subframe.²⁹ “[T]he filter $A(z)$ denotes the unquantized interpolated LP filter of the subframe, and the filter $\tilde{A}(z)$ denotes the quantized interpolated LP filter of the subframe.”³⁰ The encoder also includes a perceptual weighting filter 105 that is responsive to the LP filter coefficients for a subframe and the wideband input signal, and produces a weighted signal

²⁹ *Id.* at col. 7, l. 55 – col. 8, l. 31.

³⁰ *Id.* at col. 8, ll. 28-31.

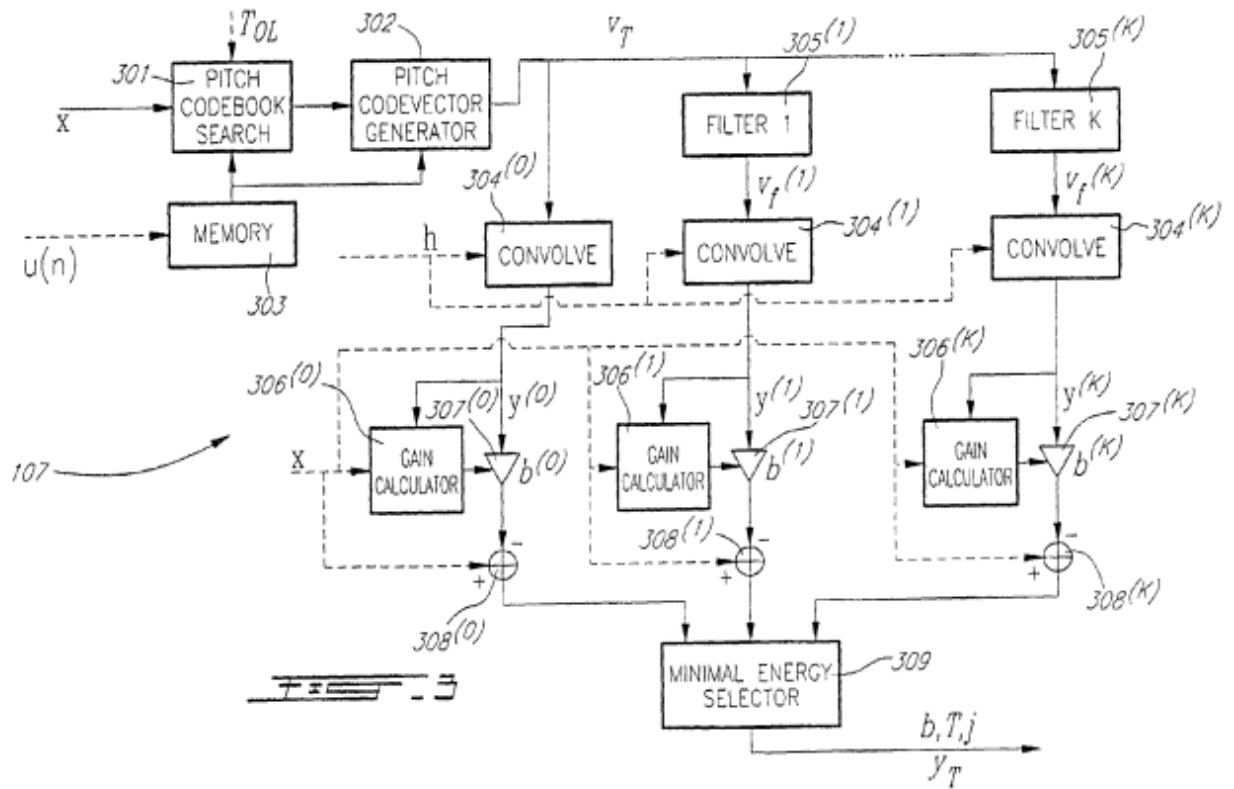
Sw.³¹ A novel approach by an embodiment of the present invention is “to introduce the preemphasis filter 103 at the input, compute the LP filter $A(z)$ based on the preemphasized speech $s(n)$, and use a modified filter $W(z)$ by fixing its denominator.”³² The encoder also includes an impulse response generator that is responsive to the LP filter coefficients and produces a weighted impulse synthesis filter impulse response signal.³³

The encoder also includes a pitch analysis device unit for producing pitch codebook parameters. A block diagram of a preferred embodiment of the pitch analysis device is illustrated in FIG. 3, which is reproduced below:

³¹ *Id.* at col. 8, l. 41 – col. 9, l. 10.

³² *Id.* at col. 9, ll. 6-10.

³³ *Id.* at col. 6, l. 46; FIG. 1.



The pitch analysis device includes a pitch codebook search device that is responsive to the perceptually weighted signal S_w and the LP filter coefficients and generates a pitch code vector and an innovative search target vector (x).

The pitch analysis device of FIG. 3 shown above has three signal paths, each of the three signal paths comprising a pitch prediction error calculating device that calculates a pitch prediction error of the pitch code vector generated by the pitch codebook search device. Each of two of the signals paths shown in FIG. 3 above have a filter that filters the pitch codevector before supplying it to the pitch prediction error calculating device. The pitch analysis device also

includes a selector (309) that chooses the signal path with the lowest calculated pitch prediction error and selects the set of pitch codebook parameters associated with the chosen signal path.

The encoder also includes an innovative codebook search device that is responsive to a weighted synthesis filter impulse response signal and the innovative search target vector, and produces innovative codebook parameters (*e.g.*, the optimum excitation codevector c_k , its gain g and the codebook index k).³⁴ The encoder also includes a multiplexor for producing an encoded wideband signal comprising the set of pitch codebook parameters associated to the signal path having the lowest pitch prediction error, the innovative codebook parameters, and the linear prediction synthesis filter coefficients.

III. SUMMARY OF THE PETITIONER'S PROPOSED GROUNDS FOR REVIEW

For the Board's convenience, below is a summary (as understood by Patent Owner) of the claim rejections proposed by the Petitioner:

1. Ground 1: Claims 1, 2, 5, 7, 8, 55, 56, 59, and 62 are alleged to be anticipated by Ozawa.

³⁴ *Id.*, col. 13, ll. 19-21.

2. Ground 2: Claims 6, 15, 42, and 60 are alleged to be obvious under 35 U.S.C. § 103(a) over Ozawa in view of G.729.
3. Ground 3: Claims 10,11,14,17, 28, 29, 32, 35, 37, 38, 41, and 44 are alleged to be obvious under 35 U.S.C. § 103(a) over Ozawa in view of Ordentlich.
4. Ground 4: Claims 15, 33, and 42 are alleged to be obvious under 35 U.S.C. § 103(a) over Ozawa in view of G.729 and Ordentlich.

IV. CLAIM CONSTRUCTION.

Patent Owner opposes the Petitioner's proposed claim constructions. The Petitioner's proposed constructions generally ignore the context of the terms within the claim.

Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. In *re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Additionally, the "appropriate context" to read a claim term includes both the specification and the claim language itself. In *re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010). If a term is "used differently by the inventor," he may provide a

special definition if he does so with “reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

a. Wideband signal (independent claims 10, 19, 28, 37, and 46).

The term “wideband signal” is used throughout the claims of the ‘521 patent including claims 10, 19, 28, 37, and 46. For example, claim 10 recites “an encoder having a pitch analysis device as in claim 1 for encoding a wideband input signal, said encoder comprising: a) a linear prediction synthesis filter calculator responsive to the wideband signal for producing linear prediction synthesis filter coefficients; b) a perceptual weighting filter, responsive to the wideband signal and the linear prediction synthesis filter coefficients.”³⁵

The term “wideband signal” has been well-known and commonly-used by those of ordinary skill in the art for years and need not be construed. When the patent application corresponding to the ‘521 patent was filed, the term “wideband signal” commonly appeared in technical publications³⁶ and

³⁵ Exhibit 1001, ‘521 patent, col. 19, ll. 38-48.

³⁶ See e.g., P. Mermelstein, “G.722, A new CCITT Coding Standard for Digital Transmission of Wideband Audio Signals,” IEEE Comm. Mag., Vol. 26, No.

patents.³⁷ Accordingly, the term “wideband signal” would have been common to one of ordinary skill in the art at the time of the filing of the ‘521 patent.

1, pp. 8-15, Jan. 1988 (describing a standard applicable to wideband signals and discussing the frequency range of wideband audio signals compared to narrowband audio signals) (attached as Ex. 2001); Fuemmeler et. al, “Techniques for the Regeneration of Wideband Speech from Narrowband Speech,” EURASIP Journal on Applied Signal Processing 2001:0, 1-9 (Sep. 2001) (noting that some work has already been done in the area of wideband speech regeneration) (attached as Ex. 2002); C.H. Ritz et. al., “Lossless Wideband Speech Coding,” 10th Australian Int’l. Conference on Speech Science & Technology, p. 249 (Dec. 2004) (noting that wideband speech refers to speech sampled at 16 kHz and acknowledging existing research into wideband speech coding) (attached as Ex. 2003).

³⁷ See, e.g., U.S. 5,581,652, filed Sep. 29, 1993 (titled: “Reconstruction of wideband speech from narrow band speech using codebooks) (Ex. K); U.S. 6,615,169, filed Oct. 18, 2000 (titled: “High frequency enhancement layer coding in wideband speech codec”) (Ex. 2004).

Moreover, the Specification of the ‘521 patent distinguishes the “wideband signal” from a traditional telephone signal:

The demand for efficient digital wideband speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications. Until recently, telephone bandwidths filtered in the range 200–3400 Hz were mainly used in speech coding applications. However, there is an increasing demand for wideband speech applications in order to increase the intelligibility and naturalness of the speech signals.³⁸

That is, the Specification of the ‘521 patent describes a “wideband signal” by comparing it to a traditional telephone signal.

Accordingly, the broadest reasonable construction of “wideband signal” in light of the Specification of the ‘521 Patent is “a signal having a bandwidth that is larger than a traditional telephone signal.”

The Petitioner’s proposed construction of a “wideband signal” as “an input signal having a bandwidth that extends at least up to 7000 Hz”³⁹ is wrong because the Specification makes it clear that a wideband signal need not have a

³⁸ Exhibit 1001, ‘521 patent, col. 1, ll. 21-30.

³⁹ Petition, p. 11.

bandwidth that exceeds 7000 Hz. For example, the '521 Patent refers to a wideband signal having a range with an upper bound at 7000 Hz: “there is an increasing demand for wideband speech applications in order to increase the intelligibility and naturalness of the speech signals. A bandwidth in the range 50–7000 Hz was found sufficient for delivering a face-to-face speech quality.” Indeed, the Specification does not contain any references to a wideband signal that exceeds 7000 Hz.⁴⁰ According to the Specification, therefore, the bandwidth of a wideband signal is at most 7000Hz, not at least 7000 Hz as asserted by the Petitioner. Thus, the Petitioner’s proposed construction is inconsistent with the Specification.

For all these reasons, the Patent Owner’s construction of a “wideband signal” as “a signal having a bandwidth that is larger than a traditional telephone signal” is the broadest reasonable construction in light of the specification and should be adopted in this proceeding.

⁴⁰ See Ex. 1001, '521 patent.

b. “means for calculating said pitch gain $b(j)$ ” (claims 6, 15, 24, 33, 42, 51).

The means plus function limitation quoted above is used throughout the claims of the ‘521 patent including claims 6, 15, 24, 33, 42, and 51.⁴¹ The function of the means plus function limitation is recited in the claims as:

“calculating said pitch gain $b^{(j)}$ using the relation:

$$b^{(j)} = x^t y^{(j)} / \|y^{(j)}\|^2$$

where $j=0, 1, 2, \dots, K$, and K corresponds to a number of signal paths, and where x is said pitch search target vector and $y^{(j)}$ is said convolved pitch codevector.”⁴²

The structure corresponding to the claimed function is “a computer performing the following algorithm:

$$b(j) = x^t y(j) / \|y(j)\|^2$$

where $j=0, 1, 2, \dots, K$, and K corresponds to a number of signal paths, and where x is said pitch search target vector and $y(j)$ is said convolved pitch codevector or equivalents thereof.” This structure is illustrated in the

⁴¹ Exhibit 1001, ‘521 patent, col. 19, ll. 38-48.

⁴² *Id.* at col. 19, ll. 11-17.

specification as FIG. 3, which is reproduced below:

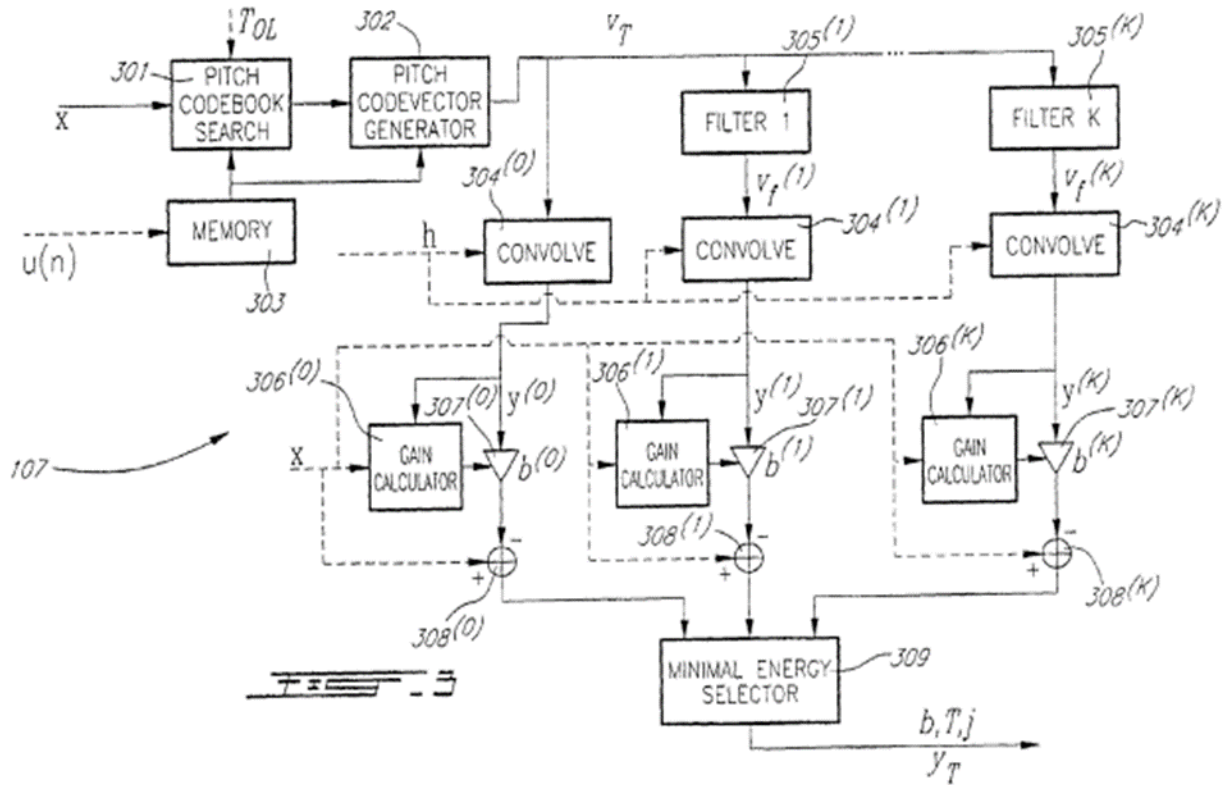


FIG. 3 illustrates a pitch analysis device with a gain calculator 306^(k) in the kth path having a pitch search target vector (x) and a convolution of a pitch codevector (V_T) with an impulse response (h) as inputs. As also illustrated by FIG. 3, the gain calculator 306^(k) produces a pitch gain $b^{(i)}$ as an output. FIG. 3 also shows that there is a gain calculator 306^(k) for each of the signal paths in the pitch analysis device. The claims clearly indicate that there are at least two of these signal paths. For example, claim 1 (from which claim 6 depends) recites “at least two signal paths associated to respective sets of pitch codebook

parameters.”⁴³ The text of the Specification of the ‘521 accompanying FIG. 3 confirms that the inputs to the gain calculator are a pitch search target vector and a convolution of a pitch codevector with an impulse response:

Once the optimum codevector V_T is determined and supplied by the pitch codevector generator 302, K filtered versions of V_T are computed respectively using K different frequency shaping filters such as 305^(j), where $j=1, 2, \dots, K$. These filtered versions are denoted $v_f^{(j)}$, where $j=1, 2, \dots, K$. The different vectors $v_f^{(j)}$ are convolved in respective modules 304^(j), where $j=0, 1, 2, \dots, K$, with the impulse response h to obtain the vectors $y^{(j)}$, where $j=0, 1, 2, \dots, K$.⁴⁴

Thus, both FIG. 3 and the accompanying text of the Specification support Patent Owner’s recitation of the corresponding structure.

For all these reasons, the Patent Owner’s recitation of the corresponding structure of the “means for calculating said pitch gain” is consistent with both the claim language and the Specification and should be adopted by the Board.

⁴³ *Id.* at col. 18, ll. 31-33.

⁴⁴ *Id.* at col. 12, ll. 18-26.

c. “means for calculating an energy of the corresponding pitch prediction error” (claims 8, 17, 26, 35, 44, and 52).

The means plus function limitation quoted above is used throughout the claims of the ‘521 patent including claims 8, 17, 26, 35, 44, and 52.⁴⁵ The function of the means plus function limitation is recited in the claims as “calculating an energy of the corresponding pitch prediction error.”⁴⁶

The structure corresponding to the claimed function is “A computer performing the following algorithm: $E = ||x - byT||^2$ or equivalents thereof.” This structure is illustrated in the specification as FIG. 3, which was reproduced above. FIG. 3 illustrates a pitch analysis device with an amplifier $b^{(K)}$ in the Kth signal path having a gain $b^{(K)}$ and a convolution of a filtered pitch codevector with an impulse response $y^{(K)}$ as inputs. As also illustrated by FIG. 3, the amplifier produces an amplified value of pitch gain $by^{(i)} = b^{(i)}y^{(i)}$ as an output. FIG 3 also shows a subtractor 308^(k) having the output of the amplifier and the pitch search target vector (x) as inputs.

Moreover, FIG. 3 also shows that there is an amplifier and subtractor structure for each of the signal paths in the pitch analysis device. The claims

⁴⁵ Exhibit 1001, ‘521 patent, col. 19, ll. 38-48.

⁴⁶ *Id.* at col. 19, ll. 27-28.

also clearly indicate that there are at least two of these signal paths. For example, claim 8 recites that a “pitch prediction error calculating device of each signal path comprises means for calculating an energy of the corresponding pitch prediction error.”⁴⁷ The text of the Specification of the ‘521 accompanying FIG. 3 confirms that the inputs to the amplifier are a gain and a convolution of a pitch codevector with an impulse response and that the inputs to the subtractor are the output of the amplifier and the pitch search target vector:

To calculate the mean squared pitch prediction error for each vector $y^{(i)}$, the value $y^{(i)}$ is multiplied by the gain b by means of a corresponding amplifier 307⁽ⁱ⁾ and the value $by^{(j)}$ is subtracted from the target vector x by means of a corresponding subtractor 308 (j).⁴⁸

Thus, both FIG. 3 and the accompanying text of the Specification support Patent Owner’s recitation of the corresponding structure.

For all these reasons, the Patent Owner’s recitation of the corresponding structure of the “means for calculating an energy of the

⁴⁷ *Id.* at col. 19, ll. 26-28.

⁴⁸ *Id.* at col. 12, ll. 26-30.

corresponding pitch prediction error” is consistent with both the claim language and the Specification.

- d. **“means for comparing the energies of said pitch prediction errors of the different signal paths and for choosing as the signal path having the lowest calculated pitch prediction error the signal path having the lowest calculated energy of the pitch prediction error” (claims 8, 17, 26, 35, 44, and 52).**

The means plus function limitation quoted above is used throughout the claims of the ‘521 patent including claims 8, 17, 26, 35, 44, and 52.⁴⁹ The function of the means plus function limitation is recited in the claims as “comparing the energies of said pitch prediction errors of the different signal paths and for choosing as the signal path having the lowest calculated pitch prediction error the signal path having the lowest calculated energy of the pitch prediction error.”⁵⁰

The structure corresponding to the claimed function is “a computer performing the following algorithm: choosing the signal path having the lowest calculated energy of the pitch prediction error or equivalents thereof.” This structure is illustrated in the specification as FIG. 3, which was

⁴⁹ Exhibit 1001, ‘521 patent, col. 19, ll. 38-48.

⁵⁰ *Id.* at col. 19, ll. 29-34.

reproduced above. FIG. 3 illustrates a selector 309 having as inputs the output of the subtractors that calculate the energy of the pitch prediction error of their corresponding signal path (e.g., 308⁽⁰⁾, 308⁽¹⁾,... 308^(K)). The text of the Specification accompanying states that the selector 309 “selects the frequency shaping filter 305^(j) which minimizes the mean squared pitch prediction error $e^{(j)} = \|x - b^{(j)} y^{(j)}\|^2$, $j=1, 2, \dots, K$.⁵¹ Thus, both FIG. 3 and the accompanying text of the Specification support Patent Owner’s recitation of the corresponding structure.

For all these reasons, the Patent Owner’s recitation of the corresponding structure of the “means for comparing the energies of said pitch prediction errors of the different signal paths and for choosing as the signal path having the lowest calculated pitch prediction error the signal path having the lowest calculated energy of the pitch prediction error” is consistent with both the claim language and the Specification.

⁵¹ *Id.* at col. 12, ll. 34.

V. THE SCOPE AND CONTENT OF THE PRIOR ART.

Any obviousness analysis requires a consideration of the scope and content of the prior art and the differences between the prior art and the claims.⁵²

The Petitioner proposed obviousness rejections based on Ozawa, G.729, and Ordentlich. These references are summarized below.

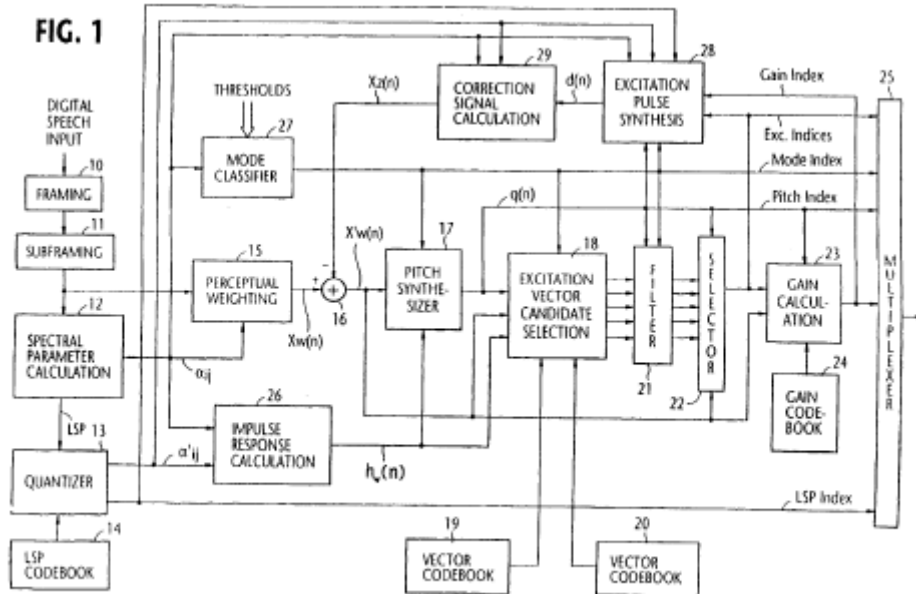
a. Ozawa (Ex. 1006).

Ozawa discloses a “code excited speech encoder.”⁵³ Ozawa’s system determines the short-term prediction coefficients (LPC) for a frame of speech data, classifies the calculated lowest prediction error of the LPC into two or more modes, and selects that mode having the lowest LPC prediction error for the frame. The mode selected for a frame is then used for selecting a single path used for the computation of the codevector distortions for all the subframes in the frame. In other words, Ozawa does not calculate pitch prediction errors for subframes for each of the different modes and select the mode with the lowest calculated pitch prediction error.

⁵² See MPEP § 2141.01, 2141.02.

⁵³ Ex. 1006, Ozawa, Abstract.

“FIG. 1 [of Ozawa] is a block diagram of a speech encoder according to a first embodiment of the present invention.”⁵⁴ FIG. 1 is reproduced below:



Ozawa’s speech encoder includes a pitch synthesizer 17 that is provided with an adaptive cookbook as well as an output sample and an impulse response and determines a pitch index indicating a pitch period:

In order to determine the pitch period at subframe intervals, the pitch synthesizer 17 is provided with a known adaptive codebook. During mode 1, 2 or 3, a pitch period is derived from an output sample $X'w(n)$ of subtractor 16 using the impulse response $h_w(n)$

⁵⁴ *Id.* at col. 2, ll. 43-44.

from impulse response calculator 26. Pitch synthesizer 17 supplies a pitch index indicating the pitch period.⁵⁵

Significantly, Ozawa makes no mention of the pitch synthesizer having “two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data,” as claimed by the ‘521 patent.

Ozawa’s speech encoder also includes a gain calculator 23 and gain codebook 24 to search for a gain code vector that minimizes distortion:

The output of the vector selector 22, the pitch index from pitch synthesizer 17 and the output of subtractor 16 are coupled to a gain search are known in the art the gain calculator 23 searches the codebook 24 for a gain code vector that minimizes distortion.⁵⁶

Significantly, Ozawa makes no mention of the gain calculator or the gain cookbook having “two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data,” as claimed by the ‘521 patent. That is, none of the components of Ozawa relating to the pitch codebook parameters have this important claim limitation.

Ozawa also discloses a second and third embodiments of his invention in FIGs. 2 and 3. But like the first embodiment, the second and third

⁵⁵ *Id.* at col. 4, ll. 17-23.

⁵⁶ *Id.* at col. 5, ll. 22-26.

embodiments do not have “two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data,”

Ozawa also specifies particular equations (*e.g.*, numbered (6) and (7)) for measuring distortion.⁵⁷ But none of the equations for distortion disclosed in Ozawa represent the pitch prediction error. As explained by Dr. Gottesman, “Ozawa does not disclose how the pitch index $q(n)$ is calculated, except that it is not indexed by the index k , hence it is not disclosed as part of the distortion optimization. Therefore Ozawa’s joint quantization distortion (6) is not long-term prediction error. Furthermore, during mode 0 there is no use of ACB at all *i.e.* no long-term prediction at all, and ... equation [6] is narrowed to FCB quantization only.”⁵⁸ Moreover, because Ozawa does not disclose “two signal paths associated to respective sets of pitch codebook parameter representative of said digitized input audio data” as recited in the claims of the ‘521 patent, Ozawa cannot possibly disclose “choosing the signal path having the lowest calculated pitch prediction error,” as also recited in the claims.

⁵⁷ *Id.* at col. 5, l. 30 and l. 39.

⁵⁸ Exhibit 2004, Declaration of Dr. Gottesman, ¶ 92.

b. G.729 (Exhibit 1004).

G.729 is a “[r]ecommendation [for a standard that] contains the description of an algorithm for the coding of speech signals at 8 kbit/s using Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-ACELP).⁵⁹

G.729 discloses a scheme in which the ACB [Adaptive Code Book] is first searched and optimized, and subsequently the FCB [Fixed Code Book] is searched:

Closed-loop pitch analysis is then done (to find the adaptive-codebook delay and gain), using the target $x(n)$ and impulse response $h(n)$, by searching around the value of the open-loop pitch delay. A fractional pitch delay with $1/3$ resolution is used. The pitch delay is encoded with 8 bits in the first subframe and differentially encoded with 5 bits in the second subframe. The target signal $x(n)$ is updated by subtracting the (filtered) adaptive-codebook contribution, and this new target, $x'(n)$, is used in the fixed-codebook search to find the optimum excitation. An algebraic codebook with 17 bits is used for the fixed-codebook excitation.⁶⁰

The G.729 block diagram of Figure 4 shows that the ACB gain and vectors (pitch search) are determined in closed loop before the algebraic codebook

⁵⁹ Exhibit 1004, G.729, p. 5 of 39.

⁶⁰ *Id.* at p. 6 of 39.

(FCB) search.”⁶¹ As explained by Dr. Gottesman, “[t]his is very different from Ozawa that discloses first searching the FCB vectors and then the ACB vectors, and then joint optimization of the ACB and FCB gains. Furthermore, since the signals used for the ACB in Ozawa and the signals used in G.729 are different, the gain values are expected to be different and may not be suitable.”⁶² The gain equation in G.729 is shown below:

$$g_p = \frac{\sum_{n=0}^{39} x(n) y(n)}{\sum_{n=0}^{39} y(n) y(n)} \quad \text{bounded by } 0 \leq g_p \leq 1.2 \quad (43)$$

Dr. Gottesman also explains that “[a]s can be seen from that equation, the G.729 ACB gain contains no consideration of FCB gains like in Ozawa.”⁶³

c. Ordentlich (Exhibit 1007).

Ordentlich discloses an encoder for Low-Delay CELP that uses extremely low subframes (<1ms). Ordentlich teaches that pitch prediction (which is claimed in the ‘521 patent) may be completely avoided for the LD-

⁶¹ *Id.* at p. 12 of 39.

⁶² Exhibit 2004, Declaration of Dr. Gottesman, ¶ 101.

⁶³ *Id.*

CELP systems, like the one that it discloses.⁶⁴ Indeed, Ordentlich implemented his LD CELP system without any pitch prediction (*see id.* Exhibits. 1025 and 1031). Moreover, LPC parameters, like those discussed in Ozawa are not transmitted in LD-CELP systems like the one disclosed in Ordentlich.

The disclosure of Ordentlich, therefore, runs far afield from the claimed invention of the '521 patent because it would have led a skilled artisan away from the '521 patent by removing the pitch prediction that is disclosed and claimed in the encoder of the '521 patent.

VII. The Petitioner Failed To Demonstrate That It Is Reasonably Likely To Prevail On Its Proposed Anticipation Rejection

“A claim is anticipated only if *each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.*”⁶⁵ “The *identical invention must be shown in as complete detail as is*

⁶⁴ Exhibit 1007, col. 4, ll. 55-56.

⁶⁵ *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (emphasis added), *see also* MPEP § 2131.02.

contained in the . . . claim.”⁶⁶ Accordingly, “there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention.”⁶⁷ The test of anticipation is a strict one - identity of invention. This test requires all claim limitations in a single reference, arranged in the same way as in the claim.⁶⁸

Petitioner asserted that claims 1, 2, 5, 7, 8, 55, 56, 59, and 62 of the ‘521 patent are anticipated by Ozawa. But Petitioner failed to show that any of these claims are anticipated by Ozawa. As explained in detail below, Ozawa fails to disclose several claim limitations and therefore, does not anticipate any claim of the ‘521 Patent.

A. Ozawa Does Not Disclose “at least two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data” As Recited In Claim 1, And As Similarly

⁶⁶ *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989)

(emphasis added).

⁶⁷ *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991).

⁶⁸ *Finisar Corp. v. Direct TV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008).

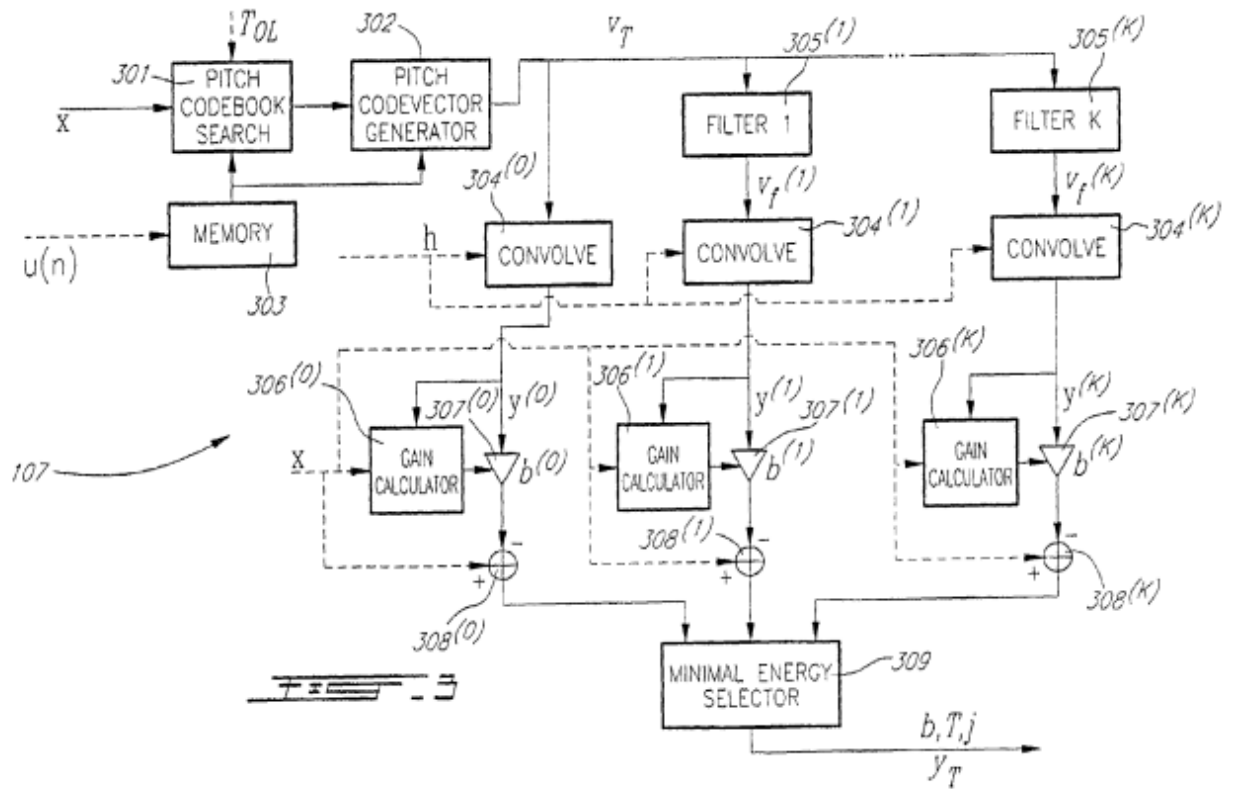
Required By The Other Challenged Independent Claims 28, 37, And 55.

The Petitioner's position that Ozawa discloses the claim limitation quoted above is based on the second and third embodiments of Ozawa's encoder.⁶⁹ More particularly, Petitioner mentioned the weighting function of the third embodiment and emphasized the excitation code vectors of the second embodiment.⁷⁰

But the claims of the '521 patent require much more than two signal paths in an encoder; they require two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data. This claim requirement is illustrated by FIG. 3 (reproduced below) of the '521 patent which shows three separate paths associated with three different sets of pitch codebook parameters that are representative of the digitized input audio data.

⁶⁹ Petition, p. 37.

⁷⁰ *Id.*



As shown above, the pitch analysis device of FIG. 3 has three signal paths: one passing through filter K on the right, one passing through filter 1 in the middle and one that does not pass through a filter on the left.

In sharp contrast, Ozawa does not disclose two or more signal paths associated with respective sets of pitch codebook parameters representative of said digitized input audio data. The excitation code vectors emphasized by Petitioner differ from the pitch codebook parameters. Indeed, Petitioner itself stated that the excitation code vectors of Ozawa are the same as the innovative

search target vectors of the '521 patent.⁷¹ The claims of the '521 patent require two or more signal paths *associated with pitch codebook parameters, not with the innovative search target vectors or excitation code vectors* emphasized by the Petition. Indeed, there isn't any disclosure of two or more signal paths in the components of Ozawa that are associated with the pitch codebook parameters (e.g., the pitch synthesizer 17, the gain calculation 23 or the gain code book 24).⁷²

Moreover, the weighting function in Ozawa that was mentioned by Petitioner relates to the comb filter 21 that produces excitation code vectors⁷³ and Petitioner failed to either identify multiple signal paths in the comb filter or explain how any such paths are associated with pitch codebook parameters.⁷⁴

For these reasons, Petitioner did not show that it is reasonably likely that Ozawa discloses this claim limitation.

⁷¹ Petition, p. 12.

⁷² *Supra*, § V.a.

⁷³ Ex. 1006, Ozawa, col. 6, ll. 41-49.

⁷⁴ Petition, pp. 37-38.

B. Ozawa Does Not Disclose That “each signal path comprises a pitch prediction error calculating device for calculating a pitch prediction error of said pitch codevector from said pitch codebook search device,” As Recited In Claim 1, And As Similarly Required By The Other Challenged Independent Claims 28, 37, And 55.

The Petitioner’s position that Ozawa discloses the claim limitation quoted above is based on Ozawa’s disclosure of minimizing the distortion represented by Equation (6).⁷⁵

But this claim limitation requires much more than calculating or minimizing any distortion function; it requires calculating a particular type of error of a particular type of vector from a particular search device: “a pitch prediction error of said pitch code vector from said pitch codebook search device.”⁷⁶ In addition, this claim limitation also requires this particular type of pitch prediction error in each of at least two signal paths. This claim requirement is illustrated by the subtractors 308 (0), 308 (1) and 308 (K) of FIG. 3 of the ‘521 patent (reproduced above) that calculate the pitch prediction errors of the pitch code vector in their respective signal paths.

Ozawa does not disclose these claim requirements. The distortion equation referenced by Petitioner (*i.e.*, equation (6)) in Ozawa does not

⁷⁵ Petition, p. 39.

⁷⁶ Ex. 1001, ‘521 patent, col. 18, ll. 36-38.

represent the pitch prediction error. And as explained above, Ozawa does not disclose at least two signal paths associated with respective sets of pitch code book parameters⁷⁷ let alone calculating pitch prediction error for each of these signal paths.⁷⁸

For this additional reason, the Petitioner did not show that it is reasonably likely that Ozawa anticipates any challenged claim of the ‘521 patent.

C. Ozawa Does Not Disclose “at least one of said at least two signal paths comprises a filter for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device of said at least one signal path,” As Recited In Claim 1, And As Similarly Required By The Other Challenged Independent Claims 28, 37, And 55.

The Petitioner asserted that Ozawa discloses the claim limitation quoted above because “Ozawa discloses that it receives the excitation vector candidates, the pitch index, and the mode index.”⁷⁹

⁷⁷ *Supra*, § V.a.

⁷⁸ Petition, p. 39, Ex. 1006, Ozawa, col. 5, ll. 22-41.

⁷⁹ Petition, p. 18.

But this claim limitation requires much more than merely receiving excitation vector candidates, the pitch index, and the mode index; it requires at least two signal paths with at least one of them having a filter that filters the pitch codevector before supplying it to the pitch prediction error calculating device.”⁸⁰

And as explained by Dr. Gottesman, Ozawa does not disclose these claim requirements because its distortion equations (6) and (7) are not a pitch prediction error calculating device and the distortion is calculated for only one signal path:

in Ozawa there is no more than one signal path for a given subframe, only one of the possible paths has filter for filtering the pitch codevector, since there is no pitch codevector used at the bypass path and therefore there is no filter for filtering the pitch codevector at the bypass path. Subsequently, there is no pitch prediction error calculating device rather than some quantization distortion defined by equation (6) and (7). The joint ACB and FCB quantization distortion (6) is calculated only when the selected path uses the pitch codebook, and FCB quantization distortion (7) is used when no pitch codebook is used. The distortion is therefore calculated for at most one signal path.⁸¹

⁸⁰ Ex. 1001, ‘521 patent, col. 18, ll. 38-42.

⁸¹ Exhibit 2004, Declaration of Dr. Gottesman, ¶ 112.

For this additional reason, the Petitioner did not show that it is reasonably likely that Ozawa anticipates any challenged claim of the ‘521 patent.

D. Ozawa Does Not Disclose “comparing the pitch prediction errors calculated in said at least two signal paths ... [and] choosing the signal path having the lowest calculated pitch prediction error,” As Recited In Claim 1, And As Similarly Required By The Other Challenged Independent Claims 28, 37, And 55.

The Petitioner’s position that Ozawa discloses the claim limitation quoted above is based on Ozawa’s disclosure of selecting excitation code vectors that minimize the amount of distortion.⁸²

But this claim limitation requires much more than comparing and selecting any type of vector that minimizes any type of distortion; it requires comparing a particular type of error in at least two signal paths and choosing the signal path having the lowest value for the particular type of error: “comparing the pitch prediction errors calculated in said at least two signal paths ... [and] choosing the signal path having the lowest calculated pitch prediction error.”⁸³ These claim requirements are illustrated by the minimal energy selector 309 of FIG. 3 of the ‘521 patent (reproduced above) that selects

⁸² Petition, pp. 39-40.

⁸³ Ex. 1001, ‘521 patent, col. 18, ll. 44-47.

the signal path having the minimum pitch prediction error calculated by the selectors.

Ozawa does not disclose these claim requirements. As explained above, the distortion referenced by Petitioner in Ozawa does not represent the pitch prediction error.⁸⁴ And as also explained above, Ozawa does not disclose at least two signal paths associated with respective sets of pitch code book parameters,⁸⁵ let alone selecting the signal path that has the minimum pitch prediction error for each of these signal paths.⁸⁶ As explained by Dr. Gottesman, “[i]n Ozawa no pitch prediction is calculated, rather than the joint quantization distortion of equation (6). The distortion is calculated for at most a single path.”⁸⁷ As also explained by Dr. Gottesman, “[w]hen distortion (7) is calculated the pitch codebook is not involved at all. The pitch codebook does not select path having lowest calculated pitch prediction, since it uses at most a

⁸⁴ *Supra*, § VII.B.

⁸⁵ *Supra*, § V.a

⁸⁶ Petition, pp. 39-40, Ex. 1006, *see* Exhibit 1006, Ozawa, col. 4, ll. 27-34 and col. 6, ll. 14-40.

⁸⁷ Exhibit 2004, Declaration of Dr. Gottesman, ¶ 113.

single path or bypassed and no need there for selecting a path that was already preselected.”⁸⁸

For these additional reasons, the Petitioner did not show that it is reasonably likely that Ozawa anticipates any challenged claim of the ‘521 patent.

E. Ozawa Does Not Disclose The “means for calculating an energy of the corresponding pitch prediction error” Recited In Claims 8, 17, 26, 35, 44, and 52.

The Petitioner alleged that Ozawa discloses the means plus function limitation quoted above because “Ozawa discloses a vector selector 22 that calculates a distortion D which is calculated as a sum of squares of the components of the joint quantization distortion using equation 5 ... The distortion or sum squared value of the joint quantization distortion given by equations 5-6 is represents an energy of the joint quantization distortion, as understood by a person of ordinary skill in the art.”⁸⁹

But as explained by Dr. Gottesman, “the distortion (6) [referenced by the Petitioner in Ozawa] is not ‘pitch prediction error’, and distortion (7) does not

⁸⁸ *Id.*

⁸⁹ Petition, p. 23.

even include pitch codevector. The distortion is calculated for a single path at any given subframe. There is no choice of signal path as part of the pitch codebook search, and the path is already preselected. There is no disclosed choice of path by choosing any lowest calculated thing.”⁹⁰ For these additional reasons, Petitioner did not demonstrate that it is reasonably likely that Ozawa anticipates any of challenged claims 8, 17, 26, 35, 44, and 52, and the claims dependent therefrom.

F. Ozawa Does Not Disclose The “means for comparing the energies of said pitch prediction errors of the different signal paths and for choosing as the signal path having the lowest calculated pitch prediction error the signal path having the lowest calculated energy of the pitch prediction error.” Recited In Claims 8, 17, 26, 35, 44, and 52.

The Petitioner alleged that Ozawa discloses the means plus function limitation quoted above solely because it “minimizes distortion.”⁹¹ But Petitioner’s allegation is clearly deficient because the claim limitation requires much more than merely minimizing distortion.

⁹⁰ Exhibit 2004, Declaration of Dr. Gottesman, ¶ 117.

⁹¹ Petition, p. 45.

But as explained by Dr. Gottesman, the distortion mentioned by the Petitioner in Ozawa is not a “pitch prediction error,” and “[t]here is no choice of signal path as part of the pitch codebook search, and the path is already preselected. There is no disclosed choice of path by choosing any lowest calculated thing.”⁹²

For these additional reasons, Petitioner did not demonstrate that it is reasonably likely that Ozawa anticipates any of challenged claims 8, 17, 26, 35, 44, and 52, and the claims dependent therefrom.

G. The Petitioner Improperly Picks and Chooses Different Features of Different Embodiments From Ozawa In Its Anticipation Argument.

To anticipate a claim, “[T]he prior art reference must clearly and unequivocally disclose the claimed invention or direct those skilled in the art to the invention without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.”⁹³ In *Net MoneyIN, Inc.*, for example, the Federal Circuit found that

⁹² Exhibit 2004, Declaration of Dr. Gottesman, ¶ 117.

⁹³ *Net MoneyIN, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008), quoting *In re Arkley*, 455 F.2d 586 (CCPA 1972).

the district court had improperly combined parts of the two different models of the prior art reference to find that a claim was anticipated.⁹⁴

Here, the Petitioner did exactly that which the Federal Circuit prohibited in *Net MoneyIN, Inc.*; it improperly picked and chose different components from three different encoders of Ozawa in its anticipation argument.⁹⁵ Indeed, Ozawa itself describes its three encoders as differing from each other:

A modified embodiment of the present invention is shown in FIG. 2 in which the vector selector 22 is connected between the gain calculator 23 and multiplexer 25 to receive its inputs from the outputs of gain calculator 23 and from the outputs of excitation vector candidate selector 18.⁹⁶

...

A modification shown in FIG. 3 differs from the embodiment of FIG. 2 in that the weighting function η of the comb filter 21 is set equal to $\varepsilon \times G$ where ε is a constant and G represents the gain code vector.⁹⁷

⁹⁴ *Id* at 1371.

⁹⁵ Petition, p. 24.

⁹⁶ Exhibit 1006, col. 6, ll. 22-25.

⁹⁷ *Id.* col. 6, ll. 41-44.

To make matters even worse for the Petitioner, the two systems referenced by the Petitioner are significantly different and incompatible. The placement of the gain calculation and gain codebook within the structure of the encoder in the first embodiment differs from their placement within the structure of the second and third embodiments.⁹⁸ The weighting function of the comb filter in the third embodiment differs from the function of the first and second embodiments.⁹⁹ That is, the Petitioner chose features of three different embodiments without explaining how they relate to each other.

Accordingly, even if the Petitioner had shown that Ozawa disclosed all of the elements of any of independent claims 1, 2, 5, 7, 8, 55, 56, 59, and 62, it still would not have demonstrated that Ozawa anticipates those claims because it needed to resort to picking, choosing, and combining various disclosures not directly related to each other in its argument for each of these claims. For this additional reason, the Petitioner did not show that any of these claims are anticipated by Ozawa.

⁹⁸ Exhibit 1006, Ozawa, FIGs. 1 and 2.

⁹⁹ *Id.* at col. 6, ll. 41-51.

VIII. The Petitioner Failed To Demonstrate That It Is Reasonably Likely To Prevail On Any Of Its Proposed Obviousness Rejections

As set forth by the Supreme Court, the question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 399 (2007) (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors define the controlling inquiry.”) A petitioner seeking to invalidate a patent as obvious must demonstrate that a “skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.”¹⁰⁰ The Petition’s evidence must also address every limitation of every challenged claim.

The Board should decline to institute an *inter partes* review on the combination of prior art for the proposed obviousness grounds because (i) the Petitioner failed to set forth a proper obviousness analysis because it did not

¹⁰⁰ *OSRAM Sylvania, Inc. v. Am. Induction Techs., Inc.*, 701 F.3d 698, 706 (Fed. Cir. 2012).

identify the claim limitations that it believed are missing from the primary reference (*i.e.*, Ozawa) and are instead taught by the secondary references (e.g., Ordentlich and G.729), (ii) the Petition failed to demonstrate that one of ordinary skill in the art would have been motivated to combine the teachings of the numerous prior art references to achieve the claimed invention with a reasonable expectation of success, (iii) the Petition failed to demonstrate that any of the different combinations teaches every element of any of the challenged claims.

A. The Petitioner Failed To Set Forth A Proper Obviousness Analysis

The Petitioner neglected to follow the legal framework for an obviousness analysis set forth long ago by the Supreme Court.¹⁰¹ The Board has previously warned that failure to identify differences between the cited art and the claims is a basis for denying a petition:

¹⁰¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 399 (2007) (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors define the controlling inquiry.”)

A petitioner who does not state the differences between a challenged claim and the prior art, and relies instead on the Patent Owner and the Board to determine those differences based on the rest of the submission in the petition risks having the corresponding ground of obviousness not included for trial for failing to adequately state a claim for relief.¹⁰²

The Petitioner ignored the Board's warning by failing to identify the differences between the challenged claim and the prior art. That is, the Petitioner failed to identify the claim limitations that it believed are missing from the primary reference (*i.e.*, Ozawa) and that it believed are instead taught by the secondary references (*e.g.*, Ordentlich and G.729).¹⁰³ Rather, the Petitioner listed a claim limitation and provided a partial description of one or more of the references, leaving the Board to figure out which reference the Petitioner is principally relying upon to teach the claim limitation and why the Petitioner relied upon a particular secondary reference.¹⁰⁴

¹⁰² *Liberty Mutual v. Progressive Casualty*, CBM-2012-00003, paper 7 at 2 – 3.

¹⁰³ *See e.g.*, Petition, pp. 14-31.

¹⁰⁴ *See e.g., id.*

This technique obscures the arguments, forcing the Patent Owner to “conjure up arguments against its own patent.”¹⁰⁵ The Board has previously warned petitioners against this practice:

We address only the basis, rationale, and reasoning put forth by the petitioner and resolve all vagueness and ambiguity in Petitioner’s arguments against the Petitioner. ... It would be unfair to expect the Patent owner to conjure up arguments against its own patent, and just as inappropriate for the Board to take the side of the Petitioner to salvage an inadequately expressed ground ...”¹⁰⁶

On this basis alone, *inter partes* review based on obviousness should be denied.

B. The Prior Art Does Not Teach All Of The Limitations Of The Challenged Claims.

1. The Secondary References Do Not Teach The Limitations From The Independent Claims That Are Missing From The Primary Reference

As explained above, the principal reference of Petitioner’s proposed obviousness rejections (*i.e.*, Ozawa) does not teach all of the limitations of any

¹⁰⁵ *Liberty Mutual v. Progressive Casualty*, CMB-2012-00003, paper 8 at 14 - 15.

¹⁰⁶ *Id.*

of the challenged independent claims (*i.e.*, claims 1, 28, 37, and 55).¹⁰⁷ And the Petitioner did not allege that any of the secondary references (Ordentlich and G.729) teach the limitations that have been shown to be missing from Ozawa.¹⁰⁸

2. The Combination Of Ozawa and G.729 Does Not Teach The “means for calculating said pitch gain $b^{(i)}$,” Recited In Claims 6, 15, 24, 33, 42, And 51.

The Petitioner alleged that the combination of Ozawa and G.729 teaches the means plus function limitation quoted above because “G.729 discloses that the pitch gain can be calculated using the claimed equation.”¹⁰⁹ But as explained above, the structure from the Specification corresponding to the claimed function is “at least two gain calculators, each gain calculator having a pitch search target vector and a convolution of a pitch codevector with an impulse response as inputs, and producing a pitch gain as an output.”¹¹⁰ And

¹⁰⁷ *Supra* § VII.

¹⁰⁸ Petition, pp. 24-60.

¹⁰⁹ Petition, p. 24.

¹¹⁰ *Supra*, IV.b.

the Petitioner did not even attempt to show that G.729 discloses this structure.¹¹¹

Indeed, as explained by Dr. Gottesman, “the gain g_p calculated in G.729 is calculated for a single path. Also, Ozawa uses pitch codebook gain during only one path, and no pitch codebook on the other path, where G.729 has a single path that is used at all times.”¹¹²

C. A Skilled Artisan Would Not Have Combined The Teachings Of Ozawa With Ordentlich and G.729 To Achieve The Claimed Invention With A Reasonable Expectation Of Success.

Proposed Ground 2 requires Ozawa to be combined with G.729 and proposed Ground 3 requires Ozawa to be combined with Ordentlich. Proposed Ground 4 requires Ozawa to be combined with both G.729 and Ozawa.¹¹³ But the Petition’s motivation to combine is rooted in forbidden hindsight analysis that is based on its incorrect assumption regarding the level of ordinary skill in the art. The Petitioner failed to provide any evidence whatsoever that combining the various portions of the references would achieve the particular structure of, *inter alia*, a linear prediction synthesis filter,

¹¹¹ See Petition, pp. 24-25.

¹¹² Exhibit 2004, Declaration of Dr. Gottesman, ¶ 150.

¹¹³ Petition, pp. 27-37.

a perceptual weighting filter, an impulse response generator, a pitch codebook search device, a pitch analysis device having at least two signal paths each having a pitch prediction error calculating device and a filter, an innovative codebook search device, and a signal-forming device for producing an encoded signal comprising a set of pitch codebook parameters having the lowest pitch prediction error, innovative codebook parameters, and the linear prediction synthesis filter coefficients, as required by many of the challenged claims of the '521 patent.¹¹⁴

Ordentlich is directed to a Low-Delay CELP that uses extremely low subframes (<1ms),¹¹⁵ significantly smaller than the 5-10ms subframes used for CELP like the system of Ozawa. Indeed, Ordentlich teaches that pitch prediction (which is claimed in the '521 patent) may be completely avoided for Low-Delay CELP systems, like the one it discloses.¹¹⁶ Indeed, Ordentlich implemented his Low-Delay CELP system without any pitch prediction.¹¹⁷

¹¹⁴ See *e.g.*, Petition 21-23.

¹¹⁵ See Ex. 1007, Ordentlich, cols. 3-4

¹¹⁶ *Id.* at col. 4, ll. 55-56.

¹¹⁷ See *id.* and Exhibits. 1025 and 1031.

Moreover, the LPC parameters discussed in Ozawa are not transmitted in LD-CELP systems like the one disclosed in Ordentlich.

The Petitioner did not suggest why a person of skill would drastically modify the structure of Ozawa with the teachings Ordentlich given that the two references use two different sampling rates, compute parameters for different bands and/or sampling rates, have different parameter ranges, have different codebooks, have different LPC orders, have different weighting filters, and have different frame sizes. Petitioner does not identify what problem was unresolved in Ozawa that is solved by rearranging its components in the manner taught by Ordentlich.¹¹⁸

Indeed, it is unclear how the teachings of Ozawa and Ordentlich could be combined in the manner suggested by the Petitioner to achieve the claimed invention with a reasonable expectation of success because the references are directed to very different systems. Ozawa would have been rendered unsuitable for its intended purpose of supporting CELP if it had been modified

¹¹⁸ See Petition, p. 22; see also *Heart Failure Techs.*, IPR2013-00183, Paper 12, at 9 (finding Petitioner's assertion that references concerned the same field did not amount to an "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness").

to instead support Low Delay CELP as taught by Ordentlich. Instead of achieving the claimed system of the '521 patent, Ordentlich would have motivated a skilled artisan to remove the pitch prediction of Ozawa, thereby moving further from the claimed invention of the '521 patent.

Next, as explained by Dr. Gottesman, Ozawa and G.729 “are three different algorithms, that use different signals, operate in different order, and optimize different distortions and equations.”¹¹⁹ As explained by Dr. Gottesman in detail, “[t]he G.729 discloses a scheme in which the ACB [Adaptive Code Book] is first searched and optimized, and subsequently the FCB [Fixed Code Book] is searched. The G.729 block diagram illustrates that the ACB gain and vectors (pitch search) are determined in closed loop before the algebraic codebook (FCB) search.”¹²⁰ As explained by Dr. Gottesman, “[t]his is very different from Ozawa that discloses first searching the FCB vectors and then the ACB vectors, and then joint optimization of the ACB and FCB gains. Furthermore, since the signals used for the ACB in Ozawa and the signals used in G.729 are different, the gain values are expected to be

¹¹⁹ Exhibit 2004, Declaration of Dr. Gottesman, ¶ 154.

¹²⁰ *Id.* at ¶ 101.

different and may not be suitable.”¹²¹ For these reasons, Dr. Gottesman concluded that “one skilled in the art would understand that the G.729’s ACB gain calculator that calculates one ACB gain cannot be combined with Ozawa gain calculator 23 that calculates one ACB gain and two FCB gains.”¹²² The gain equation in G.729 is shown below:

$$g_p = \frac{\sum_{n=0}^{39} x(n) y(n)}{\sum_{n=0}^{39} y(n) y(n)} \quad \text{bounded by } 0 \leq g_p \leq 1.2 \quad (43)$$

“As can be seen from that equation, the G.729 ACB gain contains no consideration of FCB gains like in Ozawa.”¹²³

When the Board considered this very same type of unsupported argument for combining the teachings of different systems from different prior art references in *Epistar v. Boston University* (IPR2013-00298), it declined to institute the IPR.¹²⁴ There, the Board reasoned that “Petitioner does not show

¹²¹ *Id.*

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Epistar, et al. v. Trustees Of Boston University*, IPR2013-00298, Decision Not To Institute, Paper No. 18 (P.T.A.B. November 15, 2103).

sufficiently that Manabe’s process conditions produce a similarly ‘polycrystalline’ GaN buffer layer, when gallium is selected over aluminum as a starting material.”¹²⁵ The Board further reasoned that “Petitioner identifies no objective evidence — for example, experimental data — tending to establish the structure of a GaN buffer layer grown under Manabe’s process conditions.”¹²⁶

Here, as in *Epistar*, the Petitioner failed to provide experimental data or other objective evidence indicating that a “skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.”¹²⁷

For this additional reason, the Board should not institute this IPR proceeding on proposed obviousness grounds 2, 3 or 4.

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *OSRAM Sylvania, Inc. v. Am Induction Techs., Inc.*, 701 F.3d 698, 706 (Fed. Cir. 2012).

IX. Conclusion

For all the reasons expressed herein, the Petitioner did not show that it is reasonably likely that it will prevail on any of the proposed grounds of rejections. Accordingly, the Petition should be denied.

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CERTIFICATE OF SERVICE

Under 37 C.F.R. §§ 42.6(e), this is to certify that I caused an electronic copy of the foregoing PATENT OWNER'S PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.107(A) and its exhibit to be served on the Petitioner's lead and backup counsel listed below by filing in the Patent Review Processing System and by email to the following email address:

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